

REMARKS

Claims 13-22 and 24-31 are pending in this application, and claims 13 and 31 are in independent form. Claims 13-22 and 24-31 are rejected under 35 U.S.C. § 103(a) for obviousness over United States Patent No. 5,289,867 to Barker et al. (hereinafter “the Barker patent”) in view of United States Patent No. 6,430,461 to Andorfer et al. (hereinafter “the Andorfer patent”) and further in view of United States Patent No. 5,770,832 to Carnes (hereinafter “the Carnes patent”). Claims 13 and 31 are amended. Support for the amendment can be found in the specification at paragraphs [0030] and [0031]. No new matter has been entered.

As defined by independent claim 13, the present invention is directed to a system for on-line prediction of mechanical property characteristics for hot rolled coils in a hot strip mill. The system includes a unit providing data on a rolling schedule in addition to chemistry regarding the product in the steelmaking stage. The system also includes field devices for obtaining real-time measuring parameters of the hot rolled coils during the rolling process. The data from the field devices is captured and converted using segment tracking from time domain data, showing the results of the variation in speed of rolling and variation on header jet openings on a segment of the strip to space domain data, showing the finish rolling temperature for a segment by dividing a strip into segments and collecting history process data by tracking measured data for each segment at a plurality of points as it moves through the strip mill and storing the process history as a segmental file. The system further includes a computation module that processes a segmental file and predicts mechanical properties of the hot rolled coils, the properties along the length and through the thickness of the strip being rolled and displays the average coiling temperature and a plurality of actual values of the coiling temperatures at any point over the length for comparison for determining accuracy and displaying predicted values for each segment is further provided so preventive and corrective action can be taken during rolling, the values displayed being one or more of a cooling temperature, ferrite grain size, yield strength, ultimate tensile strength, percentage elongation, and nitrogen in solid solution/precipitate.

The Cited Prior Art

The Andorfer patent refers to a process to estimate in advance the expected material properties at each step of the hot-rolling production process. On-line detection of the actual and momentary production conditions during the rolling process enables deviations to be corrected in the subsequent step of the process. (Andorfer, Col. 3, ll. 46-49.) The Andorfer patent further utilizes time-temperature curves for heating, cooling, and deformation to determine changes for maintaining the required mechanical/technological material properties.

The Barker patent refers to a cooling system for use with a continuously rolled rod. The three-step process is ongoing and includes rod testing, comparison with historical data, and determination of new set points. (See Barker patent, Col. 7, ll. 57-64.) The process set points remain the same until new set points are entered to the controller. (See Barker patent, Col. 7, ll. 57-64.) Set point information is given to a controller to obtain the desired physical properties of the rod. (See Barker patent, Col. 6, ll. 51-54.) The set point is the nature of a valve position or fluid flow rate and the controller uses this information to set a motorized valve to obtain proper flow rate of fluid. (See Barker patent, Col. 6, ll. 59-66.) The Barker patent further provides that the system has continuous information as to the position of the motorized valve and actual flow rate information. (See Barker patent, Col. 7, ll. 1-3.) Therefore, the programmable logic controller is knowledgeable of the desired and actual flow rates and adjusts the flow rate to appropriately match the desired flow rate as previously determined by the set point. (See Barker patent, Col. 7, ll. 3-7.)

None of the Prior Art Teaches or Suggests the System of Independent Claim 13

Claims 13-22 and 24-31 stand rejected under 35 U.S.C. §103(a) for obviousness based upon the Barker patent in view of the Andorfer patent. In view of (the above amendments and) the following remarks, Applicant respectfully requests reconsideration of this rejection.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed

combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (MPEP §2143)

First, the Examiner has failed to state any suggestion or motivation to one skilled in the art to modify the references or to combine the Barker patent with the Andorfer patent. The obviousness analysis "should be made explicit" in that there "must be some articulated reasoning with rational underpinning to support the legal conclusion of obviousness." A rejection "on obviousness grounds cannot be sustained by mere conclusory statements." (*KSR v. Teleflex*, 550 U.S. 398, 127 S. Ct. 1727 (2007), citing *In re Kahn*, 441 F.3d 977 (Fed Cir . 2006)). In addition, there would be no desirability by one having ordinary skill in the art to use a system for continuous cast process using offline regression analysis to interpolate flow rates of the Barker patent, in a hot rolled process for estimating mechanical properties, as shown in the Andorfer patent.

Second, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). As the Andorfer patent does not anticipate the limitation of independent claim 1, as amended, having a means for converting the measured data from time domain, showing the results of the variation in speed of rolling and variation of header jet openings on a segment of the strip to space domain, showing the finish rolling temperature for a segment using segment tracking by dividing a strip into segments and collecting process history data by tracking measured data for each segment at a plurality of points as it moves through the strip mill and storing said process history as a segmental file, a *prima facie* case of obviousness cannot be made. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). (MPEP §2143.03)

Segmentation tracking as set forth in independent claim 13 which has been amended in an effort to further prosecution, is a process by which the strips operated on in the present invention are segmented and tracked logically for variability. The variability is a variation in speed of rolling and variation of header jet openings on a segment of the strip as a result of fluctuations in speed and header openings due to a need to control the finish rolling process effectuating changes throughout the entire rolling process. The segmentation in the present invention is provided by dividing a total strip into a number of segments and tracking

measured data historically for each segment. This process data is stored in a segment file which is then input for a computational module. The Examiner has stated in the present Office Action that the Andorfer patent teaches segmentation, reasoning that Andorfer discusses time temperature curves for cooling, deformation, and heating and by implication, therefore segmentation. However, these curves are not related to segmentation as they are only a tool for determining a simple relationship between temperature and time for the mechanical response. The Andorfer patent describes using the curves to determine mechanical properties in between steps on the strip mill. Andorfer gives no teaching or suggestion that the rolling strip should be segmented as in the present invention nor does Andorfer discuss segmentations of the strip in connection with the curves. The Barker patent and the Carnes patent fail to cure this deficiency.

Additionally, there is no teaching or suggestion for the further limitation requiring a computation module for processing the segmental file in the Andorfer patent. The Barker patent and Carnes patent again fail to cure this deficiency.

Another novel and innovative concept of the present invention is a display unit for displaying the average coiling temperature and a plurality of actual values of the coiling temperatures at any point over the length for comparison for determining accuracy and displaying predicted values for each segment, the values being one or more of a cooling temperature, ferrite grain size, yield strength, ultimate tensile strength, percentage elongation, and nitrogen in solid solution/precipitate, so preventive and corrective action can be taken during rolling. In the presently claimed invention, this displayed information is shown in a display unit.

Applicant respectfully submits that the Andorfer patent does not teach or suggest such a display unit. The Examiner has cited the Andorfer patent, Column 3, line 30 to Column 4, line 45 as teaching a display unit. In this passage, however, there is no discussion of displaying data and no mention of a display unit. The passage describes using data to calculate material properties and transmit changes in data to the control systems of the heating, rolling, and cooling plant. The changes are calculated on the line. (See Andorfer patent, Col. 4, line 38 – Col. 4, line 45.)

As stated previously, the Barker patent also describes performing calculations off-line during simulations on a computer with the results sent to a controller, but only in sequence between rods entering the system. (See the Barker patent, Col 14, ll. 67-68.) The

Application No. 10/551,251
Paper Dated: April 14, 2010
In Reply to USPTO Correspondence of October 14, 2009
Attorney Docket No. 4544-052909

Barker patent does not teach or suggest having a display for segments of a strip nor does it teach or suggest the display of values as the rod is rolling in the system. For the reasons stated hereinabove, Applicant believes that the subject matter of independent claim 13 is not rendered obvious by the Barker patent in view of the Andorfer patent and the Carnes patent. Reconsideration of the rejection of claim 13 is respectfully requested.

Claims 14-22 and 24-30 depend from and add further limitations to amended independent claim 13 (or a subsequent dependent claim) and are believed to be patentable for the reasons discussed hereinabove in connection with amended independent claim 13. Reconsideration of the rejection of claims 14-22 and 24-30 is respectfully requested.

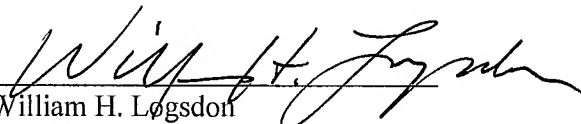
Independent claim 31 has been amended similarly to independent claim 13, accordingly, for the reasons stated hereinabove with regards to claim 13, reconsideration of the rejection of claim 31 is respectfully requested.

Conclusion

For the reasons set forth above, Applicant believes claims 13-22 and 24-31 are patentable over the cited art and are in condition for allowance. Reversal of all of the Examiner's rejections and allowance of these claims are respectfully requested.

Respectfully submitted,

THE WEBB LAW FIRM

By 

William H. Logsdon
Registration No. 22,132
Attorney for Applicant
436 Seventh Avenue
700 Koppers Building
Pittsburgh, PA 15219
Telephone: (412) 471-8815
Facsimile: (412) 471-4094
E-mail: webblaw@webblaw.com